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The JFACC in a Network Centric World

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature_____

5 February 2001

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Abstract

THE JFACC IN A NETWORK CENTRIC WORLD

The current conception of the Joint Forces Air Component Commander (JFACC) is rapidly becoming obsolete. The weapon systems the JFACC and his staff control are capable of greater speed and flexibility than can be controlled by the current system. Current organization of the Air Operations center is cumbersome and inflexible. Command and control processes such as decision cycles and air tasking order production are too slow to maximize the potential of today's airpower.

Network Centric Warfare holds the promise of rectifying many of the shortfalls of the current JFACC system. Through NCW techniques such as networking, reachback and virtual organizations, NCW promises to bring a military-technical revolution to aerospace command and control. NCW will allow the JFACC's Air Operation Center and corresponding staff to decentralize in two ways. First, NCW will allow for geographically deployed units to act as single organization. This will allow for more agile AOC support to the Joint Forces Commander (JFC). Second, NCW will allow for the decentralization of control of airpower assets. Decentralized control will facilitate quicker more responsive decision cycles.

With the advent of NCW technologies and techniques command and control of airpower will take a large step forward. It is time critical to outline the course this technology will take in order to be of the greatest benefit to the JFACC and his staff.

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15.Abstract: The current Joint Forces Air Component Command (JFACC) command and control (C2) structure is rapidly becoming cumbersome and unable to meet the challenges of modern warfare. The infrastructure and manning required to meet the needs of command and control of the air are too large. The current processes involved in the control of air assets are excessively lengthy and unresponsive. These processes limit the flexibility and speed of modern aircraft and sensors.
Network Centric Warfare (NCW) holds the promise of mitigating many of the current shortfalls in the system. Through networking and reachback principles, NCW will allow geographically dislocated entities to function as one organization. This ability enables JFACC staffs to become more agile and adaptable. It also facilitates the distribution of control to decision makers who can rapidly analyze, decide and act in given situations, thereby enabling a pace of operations not previously possible.. All of this will allow the JFACC to more efficiently and effectively employ airpower than ever before.

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With exponentially exploding technology in weapons and our ability to process information, the ability to optimize the command and control structure will take on even greater importance.[1]

General Charles C. Krulak, USMC (ret.)

Thesis:

The marriage of Network Centric Warfare (NCW) and the Joint Force Air Component Commander (JFACC) concept represents a "military-technical revolution"[2] in aerospace command and control (C2). The current JFACC system is cumbersome and falling behind in its ability to deal with the fast paced warfare of today. By its nature, NCW has the potential to address many of the shortfalls of the current JFACC system. NCW, however, will not change the fundamental nature of war, nor can it solve all of the problems in the current JFACC system. This paper will focus on the potential and limitations of NCW in terms of C2 in the context of the JFACC.

Introduction:

The concept of Network Centric Warfare promises to advance command and control to new levels of efficiency. NCW is the "effective linking or networking of knowledgeable entities that are geographically or hierarchically dispersed."[3] Conceptually, NCW provides **battlespace entities*** with "shared battlespace awareness"[4] through interconnectivity and networking techniques. This in turn facilitates the movement of information and decisions at rates and efficiencies previously unattainable. These **virtual organizations** can use **Common Operational Pictures** (COPs) to "self-synchronize,"[5] and show the potential for reducing the fog and friction of war as well as shortening decision and execution times. The ability to relay a common picture of the war and share information with geographically

* Bold type indicates words and phrases defined in the glossary.

dislocated sensors, deciders and actors will reduce their Observe, Orient, Decide and Act (OODA)[6] loop time. This increased speed of decision-making increases the flexibility, lethality, and speed of airpower.

For all that NCW promises to bring to the JFACC, there are problems that it cannot fix. Conflicts in, or problems with doctrine, inadequate or convoluted command and control structures and procedures, and poor decision-making are still issues that must be addressed. NCW cannot change the nature of warfare. "War is an act of human intercourse."[7] As such, the technology of NCW can only go so far in the correction of uniquely human problems. Additionally, the scope of this paper will not deal with the specifics of required C2 systems, issues of connectivity, or the efficacy of the JFACC concept. The promise of NCW lies in dramatically increased efficiency and flexibility in the conduct of the air war.

In its current form, the Joint Forces Air Component Commander (JFACC) is the central element of the concept of centralized command and control and decentralized execution of air assets.[8] The JFACC function is to control air and space power in a given area of operations. In accordance with joint doctrine, the JFACC is appointed by and works directly for, the Joint Force Commander (JFC)[9]. The JFACC concept also incorporates key tenets of airpower application. According to Air Force Doctrine Document 1(AFDD 1), "*Air and Space power must be controlled by an airman who maintains a broad strategic and/or theater perspective in prioritizing the use of limited air and space assets to attain the objectives of all U.S. forces in any contingency across the range of operations.*"[10] History is full of examples of the perils of dividing up airpower assets and the advantages of centrally controlling them.[11] It is believed that parceling airpower out to various agencies and tasks will negate its inherent massing, flexibility, and transcendent scope of operations qualities. It

should also be emphasized that doctrinally the JFACC should be "an airman who maintains a broad and/or theater perspective." The concept of perspective will become particularly relevant with the advent of NCW.

The Issues:

To properly evaluate NCW's contribution to the JFACC function, it is important to understand the current JFACC organization and tasks. Current JFACC staff functions are generally conducted from a centralized location called an Air Operations Center (AOC). Most JFACC functions centrally executed in the AOC. In general, these functions are planning, coordinating, allocating, tasking, and executing airpower operations in accordance with JFC objectives.[12] This centralization brings with it a litany of problems.

First, this centralized location represents a critical node in the command and control of a major element of military forces. A determined and skilled enemy could exploit this critical vulnerability. Destruction of such a lucrative target would cripple air operations. There is no redundancy in the system to deal with a loss of the AOC. All functions contained within it are singular in nature.

Second, due to the size of its structure, the AOC is cumbersome and difficult to move. A staff of roughly 1300,[13] and its infrastructure, requires a large logistical effort to deploy. Its large "footprint" also puts a premium on suitable facilities. In general, AOCs need to be housed in large, hardened facilities. Any political sensitivities of host nations to a large presence of Americans and their coalition partners also add to the problems of locating the center.

Third, the AOC's large size makes it difficult to implement such operations aboard a ship. Not having this option in a world where access to suitable facilities ashore may not be

available is a serious limitation. Afloat operations would greatly increase the flexibility of the JFACC as far as positioning and/or situations wherein the Navy provides the preponderance of airpower.[14]

Fourth, the current structure is inflexible with regard to situation and location. In the DOD's final report to Congress on the war in Kosovo, this deficiency was identified. "Operation Allied Force highlighted the need for the Department to develop expeditionary air operations centers and equip them with supporting resources and manpower to enable U.S. forces to create combined air operations centers that can be tailored to the crisis at hand and deployed quickly."[15]

Fifth, by definition, the current structure concentrates the command and control of aerospace power in a single location and person. The amount of information and decision making required to plan and execute an air campaign is enormous, and beyond the physical capabilities of a single person.[16] The bulk of this effort is shouldered by the AOC staff. However, the JFACC remains the final decision authority. This tends to make the JFACC a single point of failure. If the JFACC is somehow removed from the battle, the ramifications of this loss could be catastrophic. Dispersal of control would help to mitigate this problem.

Finally, to properly train an AOC staff in its wartime functions and configuration is a mammoth task. One of the few exercises that effectively accomplishes this is *Ulchi Focus Lens* (UFL). UFL is a combined joint command and control exercise conducted by the 7th Air Force AOC, located at Osan AB, South Korea. In addition to the staff on hand, hundreds of augmentees from various locations are required to flesh out the war time complement of people needed to make the AOC work. Additionally, large numbers of people are needed just to run the simulation, and act as the appropriate coordinating agencies. While

productive, the exercise is expensive and time consuming. It also offers little chance for other JFACCs from different locations or commands to be trained.

While the centralized nature of the current AOC C2 structure creates some unique problems, there are procedural issues within the system itself that must also be addressed. These processes, while reasonably effective, are not efficient or optimal given the fast paced nature of modern warfare.

The Air Tasking Order (ATO) provides a single source plan for all air operations in the area of operations (AO) for a 24-hour period. Currently, the (ATO) production process takes anywhere from 36 to 48 hours.[17] It is the key C2 coordination and deconfliction document for the airwar. This cumbersome process, in the fast paced battle of modern warfare, is lengthy and unresponsive. By the time the ATO is produced, the majority of the assumptions, analysis and targeting that went into its production are out of date.

Second, one of the most severely limiting factors in the modern high-speed war is target recognition and identification. This need for speed is particularly critical in the prosecution of Time Sensitive Surface Targets (TSSTs). This is not a new problem, but one that is enjoying increased visibility in light of the proliferation of weapons of mass destruction (WMD), mobile surface to air missiles, and theater ballistic missiles. The limiting factors inherent in the prosecution of TSSTs, and other fleeting targets, are timely detection and identification. Current technology has not caught up with these requirements. Additionally, another vital piece of the identification requirement is the necessity to avoid fratricide. In Desert Storm, Allied forces suffered 107 casualties as a result of friendly fire.[18] In a casualty conscious world, this is unacceptable for a technologically advanced military.

This litany of problems with the JFACC structure of today is not all-inclusive. There are others, such as service doctrine disputes, connectivity and joint integration that are beyond the scope of this paper. Those listed above, however, hold the greatest potential to be addressed by NCW.

What Network Centric Warfare can do for the JFACC:

Network Centric Warfare's major contribution in the arena of command and control will be its ability to assimilate large amounts of data, translate it into coherent and useful information, and provide conduits that allow the key decision makers to communicate and collaborate at speeds currently unrealized, and then quickly pass these decisions to the weapons systems. Additionally, NCW will allow for shared battlespace awareness among all battlespace entities. It is these qualities that must be leveraged to alleviate the current shortcomings of the JFACC structure.

By its very nature, NCW connectivity permits decentralization of the JFACC infrastructure. Networking will allow for a "virtual" AOC structure.[19] The various functions required of a JFACC will not necessarily need to be collocated. This decentralization of the JFACC structure will serve to reduce the current vulnerability of the AOC. No longer will there be a single pressure point in the command and control structure. A geographically dispersed system is, by its nature, less vulnerable to attack and collapse. Additionally, networking allows for parallel operations for redundant systems at critical nodes. For example, the JFACC may have an alternate JFACC and his staff monitoring operations in parallel. In the event that the JFACC is forced to move due to a threat or is lost in combat, the alternate JFACC and his staff in another location will ensure seamless operations. Single

point failures can be eliminated. The robustness of such a system would be invaluable as the intensity of warfare increased.

The ability of NCW to decentralize the AOC also enables "reachback" operations.[20] Simply put, reachback operations allow given functions to be located in relatively safe locations, such as the United States. To access these capabilities, AOC staffs simply "reachback" via NCW connectivity to the desired agency for the needed support. This provides several benefits.

First, it reduces the size of the traditional AOC staff. The fact that not all segments of the AOC staff need to deploy with the JFACC means less equipment, fewer people and a smaller support base need to be moved forward. This in turn makes the AOC more compatible with austere facilities. It also minimizes U.S and coalition presence on foreign soil.

Second, through a reduced AOC signature via reachback capability, NCW would enable JFACC operations aboard ships. Afloat JFACC operations are currently hampered by the large size of JFACC staffs and required C2 systems relative to space aboard command and control ships.[21] Afloat operations are advantageous for several reasons. First, access to foreign facilities may be limited or undesirable for security reasons. Second, in a given situation, the carrier battle group may be first on scene in a crisis and provide the preponderance of airpower. As the focus of main effort shifted toward land based assets, a transition to a shore based JFACC would be greatly facilitated by having an already functioning JFACC organization. Finally, the security and survivability offered by afloat operations are invaluable. Afloat operations may not always be the option of choice, but NCW promises to make them a viable option when needed.

Third, reachback operations will allow the effective use of specialized agencies. In an era of reduced manning and budgets, pockets of special expertise and capability emerge. Organizations such as the Joint Warfare Analysis Center (JWAC), the Defense Threat Reduction Agency (DTRA), Checkmate[22], and numerous others provide unique skill sets in disciplines such as analysis and planning. These organizations provide capabilities that can augment and significantly enhance any JFACC staff. NCW will allow JFACCs and their staffs to leverage these pockets of expertise, as desired, in a time efficient manner. This capability means that some of the workload handled by the AOC staff can be delegated to agencies with unique problem solving capabilities. Injection of such expertise into the planning and execution of airpower can be a significant force multiplier. Take the following example:

Hardened, deeply buried targets are emerging as a unique target set. Such facilities normally house high value enemy command and control or WMD targets. Location and analysis of such targets is difficult and time consuming. NCW would allow these targets to be sent to the JWAC or DTRA for analysis. These agencies have the expertise and tools necessary to evaluate these unique targets and determine the best way to attack them. Not only will these agencies be able to alleviate some of the workload of the AOC staff, their solution of the targeting problem will probably be of better quality.

Finally, no two air operation scenarios are the same. This reality places a premium on the flexibility of the AOC organization. Not all AOC functions need be executed in some situations. NCW allows the JFACC to tailor his virtual organization to the task at hand. Through NCW principles such as reachback and networking, only those organizations necessary for mission accomplishment are brought to the "fight." This is particularly

relevant in such Combatant Commands ss European Command (EUCOM). EUCOM's current crisis management philosophy is to build a JTF from the ground up and tailor it to meet the current crisis.[23] This stands in contrast to the concept of standing JTFs and AOCs.[24] NCW will give CINCs and JTF commanders the ability to call upon trained and adaptable JFACCs and AOCs on short notice.

NCW will mitigate the potential danger inherent in a centralized decision making entity. For too long, the terms command and control have been inexorably linked. They are, however, two very different concepts. For the purpose of this paper, command will be defined as "[t]he exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission."[25] According to Joint Doctrine "Control is inherent in command."[26] Perhaps true, but "Control" is the "procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission."[27] In short, command is authority and control is a process. Ultimately, command authority over assigned air and space assets rests with the JFACC. NCW will significantly enhance the JFACC's ability to command. Through improved connectivity with subordinates, the JFACC's ability to "direct people and organizations into actions to accomplish missions"[28] will be enhanced. This improved ability will also enable the JFACC to delegate control of assets more effectively. Properly trained subordinates, with solid guidance from the JFACC, will be informed and connected decision makers.

NCW allows for **distributive control** down to levels not previously feasible. The driving factor in the past for centralized C2 was that, the commander was usually the only entity with the "whole picture."[29] NCW allows for the distribution of vital information to the

appropriate level of control, based on the mission. The advantage in doing this is more efficient decision processes by "experts," with the knowledge required to assess, decide and act on events they have been given authority to control. This distributive control process greatly reduces the current JFACC system's vulnerability to a central failure. In the event that the JFACC is no longer a functioning entity, the AOC structure can maintain uninterrupted operations. These smaller and more efficient OODA loops allow for operational tempos never before possible.

In this type of system, however, the onus is on the commander to ensure that common understanding of his/her mission intent, as well as the objectives of a particular operation, pervade the control structure. The issuance of mission type orders (MTO)[30] through the NCW system will provide subordinate control nodes with the guidance they need to accomplish the mission. The idea is not to tell the subordinates how to do something. Instead the MTOs will tell them what needs to be done, with the "how" left to them. When properly designed and reinforced by education, training, and doctrine, centralized command and decentralized control will allow the JFACC to maximize the effective employment of aerospace power.

The issue of training is one of the most pressing today. There is a lack of sufficient expertise in the command and control of aerospace power.[31] Leveraging NCW concepts will allow a new era in training to dawn. The current effort in the Air Force to eliminate the expertise problem is the "AOC as a weapons system" program.[32] The concept is to make the training of members of the AOC mirror the training for employment of other weapon systems, such as fighters and bombers. Staff members will be required to maintain complex skills and qualifications commensurate with their wartime roles in the AOC. Command and

control involves perishable skills that will atrophy in the absence of training. Currently, the initial training in these skills is done at the Command and Control Warriors School (C2WS) a division of the Command and Control Training Innovations Group (C2TIG) at Hurlburt Field, Florida.[33] Final mission qualification training (MQT) is then accomplished within the assigned AOC. The current major training deficiency in this system is the fidelity of training. Interaction with other agencies in a given C2 process is simulated, due to the fact that these agencies are geographically dislocated or not manned in peacetime. NCW will allow the entire virtual AOC to be connected at all times. This, in turn, will enhance the frequency and quality of training.

Theoretically, "virtual" battles could be fought within the existing AOC network.[34] Rather than having to use large, cumbersome, off-board computer systems, such as Air Warfare Simulator (AWSIM)[35] to replicate an actual battlespace environment, the NCW architecture would allow a higher fidelity training opportunity using existing systems. By leveraging NCW's **virtual environment** capabilities, simulated battlespaces could be set up within the architecture of the system. Since all necessary entities would simply need to be connected to the system, the need to deploy masses of people and equipment to support training would be eliminated. NCW would allow for robust war gaming and training, with a great reduction in cost, and a substantial increase in frequency and realism.

This capability would also mean that more people could be trained per unit of time in AOC operations. Because airpower is an inherently joint endeavor, joint and combined training are crucial. Other Services and allies could be given proper equipment and train in the virtual environment. JFACCs from other Services could train with a virtual AOC from anywhere, including aboard ship. This ability to train within an AOC organization would

also allow JFACCs to tailor their joint organizations. Lines of communication, C2 relationships, information flows, and decision-making processes can be thought out and exercised prior to having to execute a wartime mission. Rather than an ad-hoc, come as you are response to a crisis, preplanned and pre-trained AOCs would stand ready to meet any challenge. NCW can take this principle to new levels of reality.

One of the hallmarks of NCW is flexibility, through its ability to share battle space awareness. One of the most cumbersome and inflexible processes in the current AOC system involves the planning and production of the Air Tasking Order (ATO). As noted earlier, production of the ATO is a lengthy process. ATOs can be in excess of 900 pages in length, and represent the entire theater air effort.[36] The ATO serves two purposes: first, it tasks individual units with arrival times, targets, and weapons. Second, it allows all players to "see" what is going on around them as they execute their missions. This deconfliction element is critical to the execution of aerial operations, to avoid duplication of effort and aiding in the overall execution of the air plan. NCW offers the potential to put in place a more responsive and easier to use system. Tasking could be transmitted in a more timely manner, based on the changing battlespace situation, in plain view of all pertinent parties. Additionally, shared battlespace awareness, in the form of a common operational picture (COP), available to all players, would give a level of situational awareness not previously known. This would have two additional benefits.

First, fratricide could be virtually eliminated. With all players possessing a real-time and accurate picture of the battle space, timely identification of potential targets would be possible. This time critical identification would mean that, even in the heat of battle, friendly forces would definitively know the identification of a target prior to engaging it. Symbology

in the shooters aircraft or weapons system would alert him that he was about to engage a friendly target.

Second, not only can fratricide be reduced dramatically, but a well-fused data picture would aid in the detection, identification and prosecution of TSSTs.[37] The TSST process currently suffers due to a lack of timely target identification. With the current system, too often, by the time the target is properly analyzed and identified, it is no longer visible. The ability to more responsively task Intelligence, Surveillance, and Reconnaissance (ISR) assets, share and analyze the information, and then give high fidelity targetable data to a shooter will be the hallmark of NCW. Take the following example:

The prosecution of TSSTs and Theater Missile Defense (TMD) share many of the same information needs. Timely detection, accurate analysis and identification, and immediate communication with a weapons system capable of engaging the target are common to both. In a networked environment, instead of competing for this information, it can be shared and collaborated without the need to be in the same location. This collaboration in real time constitutes a "self-synchronization"[38] that allows for the quick and efficient prosecution of highly lucrative targets. In this example, the two functional areas would not only aid in the analysis, but also collaborate on the best means to strike the target. If necessary, assets allocated to one control element can be used to attack the other's target nomination. With the proper delegation of control, agencies will also be able to see that the target is properly serviced in a response time not possible today.

What Network Centric Warfare can't do:

For all the potential capabilities that NCW brings to JFACC and AOC operations, there are several things it cannot do. First and foremost among these is that NCW cannot

replace people. Warfare, by its very nature, is a uniquely human endeavor. While technology can allow for a more efficient prosecution of war, it cannot change its nature. The nature of war dictates that human judgment will always be required to plan and execute operations properly in a wartime situation. "Human flexibility and common sense transcend the realm of logic."[39] Intangible elements, such as personal experience, intuition, insight, and charisma will always be the necessary hallmarks of successful leadership. While NCW can certainly aid in the decision-making process, it clearly cannot replace the decision maker. To illustrate this point, the following example may be appropriate:

Shortly after the U.S. Ballistic Missile Early Warning System (BMEWS) system came on line, it detected a launch of ICBMs from the Soviet Union. A committee was convened quickly to determine the legitimacy of the indications being given to the system. One of the committee members happened to remember that Soviet Premier Nikita Kruschev was in New York at the same time. It was thus highly unlikely the Soviets would launch an attack with their leader so exposed. This was the crucial piece of the puzzle that allowed the committee to determine that what looked like a Soviet missile launch wasn't. It was later determined that the new, powerful BMEWS radars were receiving returns from the moon. This had not been anticipated in the original configuration of the BMEWS software, so the returns were erroneously interpreted as a missile launch.[40] Not every decision-making possibility can be conceived as systems are developed. This highlights the need for human decision makers as the final authority.

Another possible problem to be considered from the human perspective is that of information overload.[41] NCW, if not properly applied, can actually add to the friction of war by inundating decision makers with too much data. A related danger is the human perception

that data coming from a machine are accurate. This can lead to a blind trust in technology that is dangerous. Some commanders may tend to discount human analysis, and act on a computer-derived solution because of this belief in the infallibility of machines.[42] Obviously, machines are fallible because the people who produce and program them are fallible. Technology cannot "heal" itself of bad logic or bad data input. Consequently, caution must be exercised in the scope and complexity of information given to decision makers. Too much of the wrong information can be more dangerous than too little of the right information.

NCW will not change the sound principles of command. There is a tendency for senior commanders to try to increase their span of direct control to increasingly lower and lower levels. This tendency comes from factors such as comfort at lower levels of command due to a familiarity and experience with them. All senior commanders were once commanders at lower levels, and may feel they know the job better than the person commanding at that level. This in turn can lead to a desire to micromanage. NCW can, in fact, facilitate micromanagement at levels never before attainable. With instant connectivity among all players, and a resultant false sense of security that the commander has the entire picture, commanders and senior civilian authorities may be tempted to assert themselves at inappropriate levels of war from strategic to tactical. In the words of General Krulak, former Commandant of the Marine Corps "molecular management of our forces is not the school solution."[43] Only trust of subordinates gained through education, the exercise of proper doctrine, and training can mitigate this problem.

The air operation over Kosovo was by far the most "connected" conflict the United States has yet fought.[44] As such, it provides a glimpse of the potential dangers inherent in

NCW. Several stories are told of senior strategic and operational level commanders directing operations at the tactical level. One such incident involves the Supreme Allied Commander Europe (SACEUR). SACEUR maintained a Predator (UAV)[45] terminal in his office that allowed him to view what the Predator was seeing. One day, as he was watching the video, three vehicles that looked like tanks, appeared on a road. SACEUR picked up a phone, called the JFACC, and directed that those tanks be destroyed.[46] In a single call, based on incomplete information, SACEUR transcended all levels of war, from strategic to tactical. Such top-down control is potentially quite dangerous.

The volume of information that is and will be available during combat situations is beyond human comprehension. It is certainly beyond the capabilities of one person to grasp and maintain. Consequently, tactical orders such as SACEUR's are ill advised. At the theater strategic level of war, one cannot possess all the information necessary to make decisions at the tactical level. As tempting as it may be for the upper echelons of command to control war at all levels, it is fraught with danger and must be avoided. In its call for unity of command, AFDD-1 noted the need for the JFACC to "maintain[s] a broad and/or theater perspective."[47] NCW cannot eliminate this fundamental requirement. The reason different levels of command exist is to ensure that proper focus is given to the strategic, operational, and tactical levels of war. Having a strategic level of command attempting to control operations at the tactical level violates this principle. This is one of the subtle but serious dangers of NCW. Only sound doctrine and training can mitigate this problem.

NCW is not a substitute for a sound command and control doctrine and structure. As noted above, there are no short cuts to C2. NCW does seem to possess a peculiar quality; it acts as a magnifier in the scope of the consequences of bad doctrine or bad decision-making.

In the past, the formal and cumbersome processes of C2 served as insulators and somewhat mitigated these shortcomings. In WWII, Hitler was a very much involved in the day-to-day battles of his military. Thinking the radio, teletype, and telex were giving up to the minute reports of the status of the front, Hitler would relay orders based on what he thought was going on. What he didn't realize is that there was an inherent time lag in the system. By the time his orders were received at the front, they were overcome by events, and simply added to the confusion. By default, his field commanders were actually making the critical decisions.[48]

Today, NCW will provide unprecedented speed and access to the tactical level of warfare from all levels. In Kosovo, the poorly conceived C2 relationships were highlighted by the poor decision-making of the upper echelons, and instantly translated into inappropriate actions at the tactical level. Rather than mitigate the errors in command, NCW had the effect of highlighting them and instantly translating them into potentially dangerous situations.

Recommendations:

From the analysis above, several recommendations can be made. First among these is the need to leverage NCW to make the Air Operations Center lighter, less centralized, and more flexible in its construct. The need to deploy air operations centers rapidly to dynamic and unanticipated situations mandates this. Current AOCs are large and inflexible in their composition. The dynamic nature of current affairs means that we need to integrate our concept of expeditionary warfare with our C2 systems and constructs. Through the use of reachback and networking this can be accomplished.

Second, in a NCW environment, the concept of control needs to be re-evaluated, and considered separately from command. The arguments of the past that claimed control needed to be retained at higher levels (because that is the only place all pertinent information is maintained) are no longer valid. NCW allows for a COP to be available at all levels of control. This, coupled with the ability of the commander to ensure a common sense of purpose across the spectrum, will allow control of assets at lower levels. This, in turn, speeds the decision making process.

Third, use NCW to train JFACCs and their staffs "jointly." The ability to network geographically dispersed entities and services will allow for robust and realistic training scenarios at a fraction of the cost of today's "common location" exercises. It will also enable C2 structures to exercise more often and to do so across Service boundaries. Training serves three purposes: First, it allows commanders to prepare their staffs to respond properly in time of crisis. Second, it serves to develop and inculcate proper C2 doctrine, as well as solve inter-Service doctrine disputes. Finally, it allows C2 organizations to train the way they will fight. This builds the JFACC's, and higher authorities', trust and confidence in the organization. This trust and confidence will aid in the mitigation of the temptation to micromanage. As AFDD 1 states, the focus of the JFACC needs to remain at strategic and operational levels.[49] It would be difficult to do this and to think tactically all at the same time.

Finally, focus the development of NCW systems to aid in making airpower control processes more efficient. The ATO process needs to be replaced. The TSST problem needs to be solved. In general, the control processes of the JFACC and AOC need to operate with

greater speed and efficiency. Properly developed, NCW technology will allow this to happen.

Conclusion:

The incorporation of NCW principles for the JFACC and his staff represents a large leap ahead in the command and control of air assets. Many shortcomings of the present JFACC system can be resolved using NCW principles and technology. There are also those things that NCW cannot solve. However, what is truly important is that we not let technology drive theory. Technology represents capabilities, present and future. It is not enough to say, "What can technology do?" We must ask, "What do we need it to do?" NCW is a tool like any other. It must have a defined purpose to be useful. It must have a well thought out doctrine to guide its development. This paper represents possible first steps upon which to focus the evolution and initiate the integration of Network Centric Warfare and the Joint Force Air Component Commander.

The American military's biggest problem? It let technology drive strategy, rather than letting strategy determine technology.[50]

Brigadier General Don Morelli, USA (ret.)

Notes

[1] Charles C. Krulak, "Doctrine for Joint Integration," Joint Forces Quarterly, (Winter 1996/97): 23.
[2] Andrew F. Krepinevich Jr., Excerpts From "The Military-Technical Revolution: A Preliminary Assessment," July 1992, Air Command and Staff College Distance Learning (ver. 2.2) CD-ROM, Maxwell AFB: ACSC/DLO, 1999.
"A military-technical revolution occurs when the application of new technologies into military systems combines with innovative operational concepts and organizational adaptation to alter fundamentally the character and conduct of military operations. Therefore, such revolutions are characterized by:
Technological change.
Military systems evolution.
Operational innovation.
Organizational adaptation.
These elements combine to produce a dramatic improvement in military effectiveness and combat potential."
[3] David S. Alberts, John J. Garstka and Frederick P. Stein, Network Centric Warfare 2d ed. rev., (Washington, DC: CCRP, 1999), 6.
[4] Ibid, 115.
[5] Ibid, 175.
[6] Joint Chiefs of Staff, Joint Doctrine Encyclopedia, (Washington, DC: 16 July 1997), 221. The concept of the "OODA loop" is attributed to the late Col. (ret.) John Boyd, USAF. He framed the OODA loop process as a way of explaining how it would be possible to defeat an enemy by using a smaller decision cycle than the adversary.
[7] Carl von Clausewitz, On War, ed. and trans. Michael Howard and Peter Paret (Princeton NJ: Princeton University Press, 1984), 149.
[8] It is important to note that this is an Air Force view of the JFACC. Other Services do not necessarily agree. Joint doctrine only calls for the centralized planning of airpower, to ensure unity of effort, followed by its decentralized execution. (Ref. Joint Pub 3-56.1) According to Joint doctrine the command and control authority of the JFACC is delegated to him by the CINC or JTF in accordance with mission requirements. The Air Force view is pertinent to this paper in that it is the pervasive basis for JFACC operations in conflicts today. In general the USAF assumes JFACC responsibilities in time of conflict. This is evidenced by the fact that every JFACC since the Persian Gulf War has been an Air Force officer.
[9] Joint Chiefs of Staff, Command and Control for Joint Air Operations, Joint Pub 3.56.1 (Washington, DC: 14 November 1994), I-2.
[10] Secretary of the Air Force, Basic Air Force Doctrine, AFDD 1(Maxwell AFB: September 1997) 23.
[11] Phillip S. Meilinger, "Ten Propositions Regarding Airpower," Airpower Journal, (Spring 1996): 66-67.
[12] Joint Pub 3-56.1, II-3.
[13] Department of Defense, Report to Congress: Kosovo/Operation Allied Force After-Action Report, (Washington, DC: 31 January 2000), 45.
[14] Joint Pub 3-56.1, II-8.
[15] Report to Congress: Kosovo/Operation Allied Force After-Action Report, 130.
[16] Thomas P. Coakley, Command and Control for War and Peace (Washington, DC: NDU Press 1992), 103.
[17] James A.Winnfield and Dana J. Johnson, Joint Air Operations: Pursuit of Unity of Command and Control, 1942-1991, (Annapolis MD: Naval Institute Press 1993), 110.
[18] Michael R. Gordon and Bernard E. Trainor, The General's War (Boston: Little, Brown and Company 1995), 457.
[19] Alberts, Garstka, and Stein, 38.
[20] William C. Martel, Twenty First Century War: The Technology of 21st Century War, (July 2000). This compilation of essays is soon to be published by Smithsonian Institution Press in 2001. For and in depth discussion of "reachback" see the article by Scott M. Britten, entitled "Directing War From Home: Reachback Operations."

[21] While the Navy has conducted exercises such as Joint Task Force Exercise 99-1 to explore the viability of afloat JFACC operations, until all the functions required of a JFACC are networked, afloat JFACC operations will be limited. While work is on-going, NCW promises mitigate many of the current limitations.
[22] Checkmate is the Air Force's premier air planning staff. It is currently located in the Pentagon. It was the Checkmate staff under Col. John Warden that laid the foundations for the air operations of Desert Storm
[23] Robert D. Chelberg, "EUCOM–At the Center of the Vortex," Field Artillery, (October 1993): 14.
[24] The current system of Air Operations Centers calls for standing organizations in fixed location. (There are two exceptions; 14 AF located at Davis Monthan AFB, AZ, and PACAF HQ located at Hickam AFB, HI maintain minimally manned AOCs) They are not manned at levels necessary for wartime operations. In time of crisis the AOC and its staff would be supplemented by augmentees drawn from other organizations.
[25] Frank M. Snyder Command and Control; The Literature and Commentaries, (Washington, DC: NDU Press 1993), 11.
[26] Joint Chiefs of Staff, Doctrine for Joint Operations, Joint Pub 3-0 (Washington, DC: 1 February 1995), II-15.
[27] Snyder, 11.
[28] Joint Pub 3-0, II-15.
[29] Meilinger, 66.
[30] Joint Chiefs of Staff, Department of Defense Dictionary of Military and Related Terms, Joint Pub 1-02 (Washington, DC: 23 March 1994, as amended through 14 June 2000), 299.
[31] Chuck Paone, Combined air operations center features Hanscom, Air Combat Command teams, 31 October 2000. <http://afmc-mil.wpafb.af.mil/organizations/HQ-AFMC/PA/news_sou/00news>. [2 February 2001].
[32] Ibid
[33] For more information concerning curriculum, class availability etc. visit the Command and Control Training Innovations Group at <http://www.c2tig.af.mil>.
[34] Alberts, Garstka, and Stein, 167.
[35] AWSIM is currently used in Korea to exercise the 7th Air Force AOC during UFL
[36] John M. Fawcett, Jr., "The JFACC Team." <http://www.searchmil.com/cgi-bin/search.dllc=309890> [4 Oct 2000].
[37] One of the critical components of the common operational picture (COP) is the need to "fuse" the varied inputs into one picture. Due to differences in reporting of collection systems a process must be in place to resolve conflicts. If these differences are not resolved the same "target" may show up as two separate targets on the COP. Proper fusion or ambiguity resolution allows for a truest possible picture of the battlespace.
[38] Alberts, Garstka, and Stein, 175
[39] Coakley 91.
[40] Ibid, 83.
[41] Ibid, 78.
[42] Ibid, 74.
[43] Krulak, 21.
[44] Report to Congress: Kosovo/Operation Allied Force After-Action Report, 46
[45] Predator is an un-manned aerial vehicle used for reconnaissance. It uses a secure datalink to relay its electro-optical picture back to ground stations. Repeater terminals can be placed virtually anywhere and allow the viewer real time imagery of what Predator is currently "seeing."
[46] Lt Gen (ret.) Michael Short, Former Joint Forces Air Component Commander for Operation Allied Force, interview by author, 9 January 2001, Naval War College, Connelly 303, Newport R.I.
[47] AFDD 1, 23.
[48] John Keegan, quoted in Thomas P. Coakley, Command and Control for War and Peace, 84-85.
[49] AFDD 1, 23.
[50] Don Morelli, referenced in Alvin Toffler and Heidi Toffler, War and Anti-War (Boston: Little, Brown and Company, 1993), 11.

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Glossary

Battlespace Entities: "The environment, factors, and conditions which must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces, facilities, weather, terrain, the electromagnetic spectrum, and the information environment within the operational areas and areas of interest."[1] The entities referred to in this paper are the sensors, deciders and actors involved in the execution of the conflict. It is the integration and interaction of these three entities that define OODA loops of combat force employment. Network Centric Warfare (NCW) defines these functions in terms of grids. "The information grid enables the operational architectures of sensor grids and engagement grids."[2] (Joint Pub 1-02)

Common Operational Picture: the fusion of all available information of the battlespace into a discernable and functional picture of the conflict. It provides a unified and cohesive picture of events to all entities involved in operations.

Distributive Control: delegation of control responsibilities and processes to levels or organizations appropriate for given missions or roles. The decentralization of control enables faster decision cycles and increased operational tempo.

Virtual Environment: the "cyber world" formed by the sensor, information and engagement grids. Essentially, every piece or aspect of the battlespace is accounted for by

one of these grids. This then creates an electronic world, which parallels the real world, and enables a network centric force to analyze, decide and act with a high degree of confidence in their situational awareness.

Virtual Organizations: Virtual organizations vary form the "conventional" organizations in the fact that they may geographically dispersed but electronically connected or networked. This concept is central to Network Centric operations and concepts. Virtual organizations can leverage the sensor, information and engagement grids to rapidly apply and control combat power at speeds never before attainable.

Notes

[1] Joint Chiefs of Staff, Department of Defense Dictionary of Military and Related Terms, Joint Pub 1-02 (Washington, DC: 23 March 1994, as amended through 14 June 2000), 74.
[2] VADM Arthur K. Cebrowski, USN and John J. Garstka, "Network-Centric Warfare," U.S Naval Institute Proceedings, 124 (January 1998), 33.

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